

A Systematic Study on the Marine Bryozoans in Korea 7. Suborder Anasca

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한국산 해산 태충류의 계통분류학적 연구 7. 무낭 아목

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적 요

한국산 해산 태충류의 계통분류학적 연구의 일환으로 1965년부터 1988년까지 남한의 삼면연안과 여러 도서지방(38개 지역)으로부터 채집된 무낭류를 동정·분류하였다. 동정한 결과 12과 18속 27종이었으며 이들 중 다음의 7종은 한국 미기록종이었다.

Membranipora perfragilis, *Membranipora serrilamella*, *Terminoflustra sagamiensis*, *Callopora lineata*, *Thalamoporella rozieri*, *Canda retiformis* and *Amastigia xishaensis*.

Key words: systematics, bryozoans, Anasca, Korea.

INTRODUCTION

The previous papers (Okada, 1923; Rho & Chung, 1975; Rho & Song, 1980; Rho & Lee, 1980; Rho & Seo, 1984, 1985, 1986; Song, 1985) dealt with 48 species of Korean anascan bryozoans.

The materials used in this study were collected from 38 localities (Fig. 1) in the coastal waters of the

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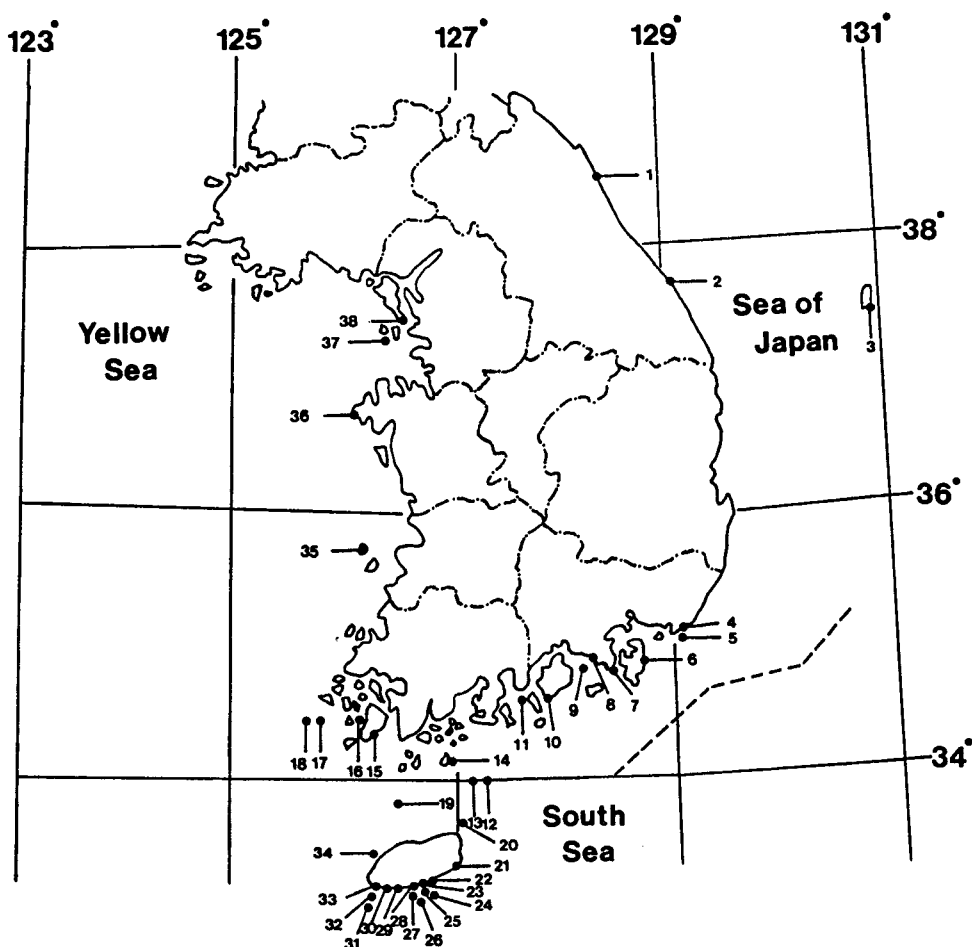


Fig. 1. Localities from which specimens of the present study were collected.

1, Taejin(大津); 2, Kündök(近德); 3, Todong(道洞); 4, Mip'o(尾浦); 5, Orukto(五六島); 6, Changsünp'o(長承浦); 7, Pijindo(比珍島); 8, Samch'önp'o(三千浦); 9, Sinsudo(新樹島); 10, Sangju(尙州); 11, Kūmodo(金鰲島); 12, Kōmundo(巨文島); 13, Sōdo(西島); 14, Ch'ōngsando(靑山島); 15, Kapto(甲島); 16, Chindo(珍島); 17, Hūksando(黑山島); 18, Hongdo(紅島); 19, Ch'ujado(楸子島); 20, Udo(牛島); 21, P'yōson(表善); 22, Pomok-ri(甫木里); 23, Sōgwip'o(西歸浦); 24, Chigwido(地歸島); 25, Chodo(鳥島); 26, Mundo(蚊島); 27, Pōmdo(虎島); 28, Sammaebong(三梅峰); 29, Pōphwan(法還); 30, Taep'o(大浦); 31, Kwabut'an(寡婦灘); 32, Kap'ado(加波島); 33, Mosūlp'o(慕瑟浦); 34, Piyangdo(飛楊島); 35, Maldo(末島); 36, Anhūng(安興); 37, Tōkchōkto(德積島); 38, Chakyakto(芍藥島).

Southern Korea during the period from 1965 to 1988 and preserved in the Department of Biology, Ewha Womans University. To identify, all of the specimens were observed by stereo, light and scanning electron microscopes.

The purpose of the present paper is to investigate the classification and distribution of the Suborder Anasca in a series of the systematic study on the marine bryozoans in Korea.

SYSTEMATIC ACCOUNT

Order 1. Cheilostomata Busk, 1852	순구 목
Suborder 1. Anasca Levinsen, 1909	무낭 아목
Division 1. Inovicellata Jullien, 1880	육질이끼벌레 군
Family 1. Aeteidae Smitt, 1867	자루이끼벌레 과
Genus 1. <i>Aetea</i> Lamouroux, 1812	자루이끼벌레 속

1. *Aetea anguina* (Linné, 1758) 자루이끼벌레

Specimen examined: Mip'o, May 25, 1981; Kap'ado, Jun. 16, 1985.

Division 2. Malacostega Levinsen, 1909	연지붕이끼벌레 군
Family 2. Membraniporidae Busk, 1854	막이끼벌레 과
Genus 2. <i>Membranipora</i> Blainville, 1830	막이끼벌레 속

2. *Membranipora tuberculata* (Bosc, 1802) 관막이끼벌레

Specimen examined: Mundo (water depth 30m), Dec. 3, 1978; Pomokto, Dec. 4, 1978; Sögwip'o, Jul. 13, 1979; Taep'o, Jan. 16, 1985; Mosŭlp'o, Jun. 18, 1985; Piyangdo, Jun. 19, 1985; Södo, Jul. 29, 1988; Chigwido, Dec. 8, 1988.

3. *Membranipora savartii* (Audouin, 1826) 막이끼벌레

Specimen examined: Chakyakto, Sep. 29, 1984; Mosŭlp'o, Jun. 18, 1985.

Remarks: The denticulate processes of the specimens collected from Mosŭlp'o were narrower and longer than ones of materials from Chakyakto.

4. *Membranipora perfragilis (MacGillivray, 1881) 유연막이끼벌레 (신칭) (Pl. 1, Figs. 1,2)

Membranipora crassimarginata var. *erecta*: Busk, 1884, p.63, pl. 19, fig. 3.

Amphiblestrum perfragile: Ortmann, 1890, p.29, pl.2, fig.5.

Membranipora perfragilis: Osburn, 1950, pp. 24,25, fig. 8; Soule et al., 1975, fig. 589, fig. 24.

Specimen examined: Chakyakto, Sep. 29, 1984.

Description: Colony encrusting, gradually forming and rising free into richly frilled and contorted masses; often anastomosing at the ends; bilaminar layers back to back. Zooecia arranged regularly, nearly rectangular; distal end somewhat arcuate. Opesium oval; cryptocyst narrow on the sides, broader at the proximal end, but sometimes limited to the proximal corners. Avicularium not found.

Remarks: Busk (1884) and Osburn (1950) reported that there were interzooecial avicularium on the encrusting base. But we found no avicularium in our specimens like Ortmann (1890).

Distribution: Korea (Yellow Sea); Japan; California; Australia.

5. *Membranipora serrilamella Osburn, 1950 톱니막이끼벌레 (신칭) (Pl. 1, Figs. 3,4).

Membranipora serrilamella Osburn, 1950, pp.22, 23, pl. 1, figs. 12, 13; Mawatari, 1956, p.115, fig. 16.

The asterisks (*) indicate the species which were newly recorded in Korea.

Membranipora serrata: Robertson, 1908, p.268, pl.16, figs. 20, 21, 21a; Okada, 1934, p.4, pl.1, fig.3.

Conopeum serrata: Okada, 1929, pp. 11, 12, text-fig. 1; Okada & Mawatari, 1937, p.434, pl.11, text-fig.1.

Acanthodesia serrata: Okada & Mawatari, 1938, p.448.

Specimen examined: Anhŭng, Oct. 26, 1984.

Description: Colony encrusting, especially on the broader shells. Zooecia arranged regularly, rectangular; distal end arcuate. Walls thick; Cryptocyst narrow, serrate with short laterally directed spinules. A short hollow spine located at each distal corner.

Distribution: Korea (Yellow Sea); Japan; California; Vancouver; Panama; Queen Charlotte Is.

Family 3. Flustridae Smitt, 1867 꼬인이끼벌레 과

Genus 3. *Terminoflustra* Silén, 1941 끝꼬인이끼벌레 속

*** 6. *Terminoflustra sagamiensis*** (Okada, 1921) 끝꼬인이끼벌레 (신칭) (Pl. 2, Figs. 1-4)

Carbasea sagamiensis Okada, 1921, pp. 23-25, text-fig. 3.

Flustra (*Carbasea*) *sagamiensis*: Canu & Bassler, 1929, p.89, fig. I-K.

Terminoflustra sagamiensis: Silén, 1941, pp. 55, 56, figs. 66, 67, pl. 3, fig. 10.

Specimen examined: Piyangdo, Feb. 5, 1986; Ch'ujado, Feb. 6, 1986.

Description: Colony decumbent, brittle, attached at the shells. Zooecia arranged regularly, nearly rectangular; distal end mostly rounded. Orifice semicircular. Avicularium small, circular, situated at the branching point; rostrum raised a little; the end of semicircular mandible dentate. The margins of the colony are strengthened by kenozooids.

Distribution: Korea (South Sea); Japan.

Family 4. Alderinidae Canu & Bassler, 1927 날개이끼벌레 과

Genus 4. *Callopora* Gray, 1848 고운이끼벌레 속

*** 7. *Callopora lineata*** (Linné, 1767) 선고운이끼벌레 (신칭) (Pl. 3, Fig. 1)

Membranipora lineata: Robertson, 1900, p.324.

Membranipora (*Callopora*) *lineata*: Borg, 1930, pp. 67, 68, figs. 57, 58.

Callopora lineata: Mawatari, 1956, p. 118, fig. 46; Kluge, 1962, pp. 343, 344, fig. 170; Rogick, 1964, p.177; Powell, 1968, p.2286; Ryland & Hayward, 1977, p.88, figs. 6F, 33; Mawatari & Mawatari, 1980, pp. 44-46, fig. 10; Mawatari, 1981, p. 90, fig. 6.

Specimen examined: Maldo (water depth 10-17m), Jul. 10, 1986.

Description: Colony encrusting the other bryozoans, *Codonellina*, unilamellar, circular. Zooecia elongate elliptical; Opesium oval, encircled by thin mural rim carrying 5-7 pairs of cylindrical spines; the distal one or two pairs of spines erect, while the rest slightly curved inward overarching the opesium. Avicularium situated at the proximal part; mandible pointed obliquely proximally. When an avicularium is placed on the ovicell of preceding zooecia, mandible directed distally. Ovicell globose, raised.

Distribution: Korea (Yellow Sea); Japan; California; Kamtschatka; Kuril I.; East Siberian Sea; Spitsbergen; White Sea; Kara sea; Laptev Sea; Bering Sea; Okhotsk Sea; Greenland; Jan Mayen; Novaya Zemlya; Chukchi Sea; Norway; Sweden; Finland; Mediterranean Sea; Baltic Sea; Adriatic Sea; United Kingdom; Florida; Iceland; Barents Sea; Alaska; Labrador; St. Lawrence Gulf; Hudson Bay.

Genus 5. *Tegella* Levinsen, 1909 거미이끼벌레 속

8. *Tegella incrustans* Silén, 1941 거미이끼벌레

Specimen examined: Hongdo, Aug. 25, 1984; Maldo (water depth 10m), Jul. 10, 1986.

Division 3. Coilostega Levinsen, 1909 덮개이끼벌레 군

Family 5 Microporidae Hincks, 1880 은공이끼벌레 과

Genus 6. *Microporina* Levinsen, 1909 은공이끼벌레 속

9. *Microporina articulata* (Fabricius, 1821) 관절은공이끼벌레

Specimen examined: Taejin, Jun. 29, 1988.

Family 6. Steganoporellidae Hincks, 1884 단추이끼벌레 과

Genus 7. *Steganoporella* Smitt, 1873 단추이끼벌레 속

10. *Steganoporella magnilabris* (Busk, 1854) 큰단추이끼벌레

Specimen examined: Mip'o, Jul. 16, 1974; Dec. 9, 1974; Orukto, Dec. 6, 1978; Sögwip'o, Jul. 13, 1979.

Family 7. Thalamoporellidae Levinsen, 1909 안방이끼벌레 과

Genus 8. *Thalamoporella* Hincks, 1887 안방이끼벌레 속

11. *Thalamoporella lioticha* (Ortmann, 1890) 미끈안방이끼벌레

Specimen examined: Orukto, Apr. 28, 1978.

12. *Thalamoporella rozieri (Audouin, 1826) 로지에르안방이끼벌레 (신칭) (Pl. 4, Figs. 1-5)

Thalamoporella rozieri: Harmer, 1926, pp. 292-295, pl. 19, figs. 3-13; Okada, 1934, pp. 10, 11; Okada & Mawatari, 1935, pp. 130, 131; 1938, p. 450; Powell, 1967, p. 166; Mawatari, 1981, p. 91, fig. 7. 29.

Specimen examined: Sögwip'o, Apr. 12, 1975; Taep'o, Jan. 16, 1985.

Description: Colony encrusting the other bryozoans or seaweeds. Zooecia regularly arranged, rectangular; cryptocyst granulated with very small pores. Orifice relatively large and round with broad proximal sinus. Two opesiules not very different in size. Avicularium situated at the bifurcation point of zooecia; mandible spatulate, distal margin rounded and toothed. Spicules, calipers and compasses.

Distribution: Korea (South Sea); Japan; Banda Sea; Sulu Is.; Clebes; Singapore; Jamaica; Torres St.; Mergui Is.; Australia; Burma; Red Sea; Egypt; United Kingdom.

Division 4. Pseudostega Levinsen, 1909 헛지붕이끼벌레 군

Family 8. Cellariidae Hincks, 1880 마디이끼벌레 과

Genus 9. *Cellaria* Lamouroux, 1812 마디이끼벌레 속

13. *Cellaria punctata* (Busk, 1852) 마디이끼벌레

Specimen examined: Sögwip'o, Jul. 11, 1965; Mip'o, Jul. 13, 15, 16, 1974; Dec. 9, 1974; Sangju, May 24, 1981; Mosulp'o, Jun. 18, 1985; Piyangdo, Jun. 19, 1985.

- Division 5. Cellularina Smitt, 1867 방이끼벌레 군
 Family 9. Bugulidae Gray, 1848 다발이끼벌레 과
 Genus 10. *Bugula* Oken, 1815 다발이끼벌레 속

14. *Bugula dentata* (Lamouroux, 1816) 치상이끼벌레

Specimen examined: Mundo (water depth 30m), Dec. 3, 1978; Sangju, May 24, 1981; Mip'o, May 25, 1981; Ch'ongsando, Jul. 25, 1981; Mip'o, Dec. 10, 1981; Sögwip'o, May 2, 1982; Pömdo, May 21, 1982; Taep'o, Jan. 16, 1985; Udo, Oct. 7, 1985; Pyosön, Oct. 9, 1985.

15. *Bugula neritina* (Linné, 1758) 큰다발이끼벌레

Specimen examined: Hüksando, Jul. 6, 1978; Samch'önp'o, Jul. 20, 1984; Tökchökto, Oct. 15, 1985; Kūmodo, Jul. 31, 1988.

16. *Bugula subglobosa* Harmer, 1926 꽃다발이끼벌레

Specimen examined: Sögwip'o, Aug. 7, 1970; Apr. 13, 1975; Mip'o, Apr. 25, 1975; Mundo (water depth 30m), Dec. 3, 1978; Sögwip'o, Jul. 13, 1979; Pömdo, May 21, 1982; Kap'ado, Jan. 7, 1985; Sammaebong, Jan. 18, 1985.

- Genus 11. *Dendrobeatia* Levinsen, 1909 수지콩이끼벌레 속

17. *Dendrobeatia murrayana* (Johnston, 1847) 무라이수지콩이끼벌레

Specimen examined: Ch'ujado, Feb. 6, 1986.

- Family 10. Beaniidae Canu & Bassler, 1927 콩이끼벌레 과
 Genus 12. *Beania* Johnston, 1840 콩이끼벌레 속

18. *Beania hexaceras* (Ortmann, 1890) 육콩이끼벌레 (Pl. 2, Figs. 5-8)

Specimen examined: Sögwip'o, Jul. 12, 13, 1979; Taep'o, Jan. 16, 1985; Sammaebong, Jan. 18, 1985; Kwabut'an, Jun. 18, 1985; Pyosön, Oct. 9, 1985; Kōmundo(water depth 15m), Jul. 25, 27, 1988; Kūmodo, Jul. 31, 1988; Piyangdo, Dec. 12, 1988.

Remarks: The colony of the specimens from Sögwip'o had not only both *Beania hexaceras* and *B. hexaceras* var. *serrata* reported by Mawatari (1965) but also mixed zooecial form of two species. Therefore, we think that *B. hexaceras* var. *serrata* is included in *B. hexaceras*.

- Family 11. Scrupocellariidae Levinsen, 1909 가시이끼벌레 과
 Genus 13. *Scrupocellaria* van Beneden, 1845 가시이끼벌레 속

19. *Scrupocellaria diadema* Busk, 1852 가시이끼벌레

Specimen examined: Sögwip'o, Oct. 19, 1978; Mundo(water depth 30m), Dec. 3, 1978; Sammaebong, Jan. 18, 1985; Mosūlp'o, Jun. 18, 1985.

- Genus 14. *Canda* Lamouroux, 1816 칸다이끼벌레 속

20. *Canda retiformis Pourtales, 1867 거물칸다이크벌레 (신칭) (Pl. 3, Figs. 2-4)

Canda retiformis: Canu & Bassler, 1929, p.212, pl.9, figs. 11, 12, fig. 73, A-C; Okada & Mawatari, 1936, pp. 56, 57.

Specimen examined: Mundo (water depth 30m), Dec. 3, 1978.

Description: Colony entangled by rectilinear segments on seaweeds and forming network in shape. Zooecia biserial, rectangular. A pair of spines at the distal corners of zooecium. Opesium occupying nearly all of the frontal surface. Scutum pistol-shaped, projected by a strong pedicel at the middle of the opesium. Cryptocyst coarsely granulated. Dorsal vibraculum triangular, situated diagonally; seta long.

Distribution: Korea (South Sea); Japan; Sulu Is.; Philippines; Florida; Mexico Gulf; Zanzibar St.

Genus 15. *Caberea* Lamouroux, 1816 카베레이크벌레 속**21. *Caberea lata*** Busk, 1852 라타이크벌레

Specimen examined: Mip'o, Jul. 15, 1974; Pijindo, Jul. 19, 1984; Sinsudo, Jul. 21, 1984; Taep'o, Jan. 16, 1985.

22. *Caberea boryi* (Audouin, 1826) 보리이크벌레

Specimen examined: Sögwip'o, May 22, 1982; Taep'o, Jan. 16, 1985; Sammaebong, Jan. 18, 1985; Pöphwan(water depth 5m), Jan. 19, 1985.

Genus 16. *Amastigia* Busk, 1852 이은이크벌레 속**23. *Amastigia rudis*** (Busk, 1852) 막대이은이크벌레

Specimen examined: Sögwip'o, Dec. 26, 1971; Apr. 13, 1975; Ch'öngsando, Jul. 25, 1981; Chodo, May 21, 1982; Sinsudo, Jul. 21, 1984; Tökchökto, Oct. 16, 1985.

24. *Amastigia xishaensis Xixing, 1984 블록이은이크벌레 (신칭) (Pl. 5, Figs. 1-4)

Amastigia xishaensis Xixing, 1984, pp. 263-265, fig. 10.

Specimen examined: Sögwip'o, Apr. 12, 1975; Taep'o, Jan. 16, 1985; Mosülp'o, Jun. 18, 1985.

Description: Colony dichotomous, entangled each other. Branches consist of 3-4 serial zooecia, more zooecia before bifurcation. Zooecium oval; cryptocyst narrow. Avicularium raised, lying transversely on the proximal gymnocyst; mandible slender and long triangular, directed distally. Ovicell very large, prominent; avicularium similar to frontal avicularium situated at the distal corner. One pore on dorsal side of the zooecium.

Distribution: Korea (South Sea); Chinese Sea.

Genus 17. *Tricellaria* Fleming, 1828 세방가시이크벌레 속**25. *Tricellaria occidentalis*** (Trask, 1857) 세방가시이크벌레

Specimen examined: Changsüngp'o, Aug. 4, 1973; Mip'o, May 7, 1974; Jul. 16, 1974; Chindo, Aug. 5, 1974; Kapto, Aug. 6, 1974; Hüksando, Jul. 6, 1978; Ch'öngsando, Jul. 25, 1981; Todong, Jul. 11, 1984; Kündök, Aug. 7, 1984; Taep'o, Jan. 16, 1985; Sammaebong, Jan. 18, 1985; Tökchökto, Oct. 5, 1985; Södo, Jul. 29, 1988; Kümmodo, Jul. 31, 1988.

- 26. *Tricellaria longispinosa*** (Yanagi & Okada, 1918) 긴세방가시이끼벌레
 Specimen examined: Ch'ŏngsando, Jul. 25, 1981; Ch'ujado, Feb. 6, 1986.

Family 12. Epistomidae Gregory, 1903 염주이끼벌레 과
 Genus 18. *Synnotum* Pieper, 1881 염주이끼벌레 속

- 27. *Synnotum aegyptiacum*** (Audouin, 1826) 염주이끼벌레
 Specimen examined: Chakyakto, Sep. 17, 1974.

ABSTRACT

As a result of the systematic study on the marine anascan bryozoans in Korea, a total of 27 species were identified and the following seven species were new to Korean fauna: *Membranipora perfragilis*, *Membranipora serrilamella*, *Terminoflustra sagamiensis*, *Callopora lineata*, *Thalamoporella rozieri*, *Canda retiformis* and *Amastigia xishaensis*.

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EXPLANATION OF PLATES

PLATE 1

Figs. 1-2. *Membranipora perfragilis* (MacGillivray, 1881)

Fig. 1. Colony.

Fig. 2. Arrangement of zooecia showing frontal membrane (fm).

Figs. 3-4 *Membranipora serrilamella* Osburn, 1950

Fig. 3. Colony encrusting the shells.

Fig. 4. Arrangement of zooecia with a pair of hollow rounded spine (sp) and narrow cryptocyst (cr).

Arrangement of zooecia with spines (sp) and avicularium (av) situated at proximal end of zooecium. In zooecia with ovicell (ov), avicularium is situated at the top of the ovicell.

Figs. 2-4. *Canda retiformis* Pourtales, 1867

Fig. 2. Colony.

Fig. 3. Zooecia with spine (sp), scutum (sc) and granular cryptocyst (cr). Seta(st) of vibraculum is showed.

Fig. 4. Dorsal view showing vibraculum (v).

PLATE 2

Figs. 1-4. *Terminoflustra sagamiensis* (Okada, 1921)

Fig. 1. Colony.

Fig. 2. Arrangement of zooecia. LM x31

Fig. 3. Mandible (arrow) of avicularium is opened. LM x200

Fig. 4. Zooecium with ovicell (ov). LM x125

Figs. 5-8. *Beania hexaceras* (Ortmann, 1890)

Fig. 5. Typical zooecium of *B. hexaceras* (arrow). LM x125

Fig. 6. *B. Hexaceras* var. *serrata* (arrow). LM x125.

Figs. 7-8. Varied zooecia of *B. hexaceras* and *B. hexaceras* var. *serrata* (arrow). LM x125

PLATE 3

Fig. 1. *Callopora lineata* (Linné, 1767)

PLATE 4

Figs. 1-5. *Thalamoporella rozieri* (Audouin, 1826)

Fig. 1. Colony.

Fig. 2. Zooecia with orifice (or) and two opesiules (os). Avicularium is situated at the branching point of zooecia.

Fig. 3. Spatulate mandible. LM x125

Fig. 4. Toothed mandible. LM x125

Fig. 5. Caliper (cl) and compass (cm).

PLATE 5

Figs. 1-4. *Amastigia xishaensis* Xixing, 1984

Fig. 1. Colony.

Fig. 2. Arrangement of Zooecia showing frontal membrane (fm).

Fig. 3. Dorsal side with pore.

Fig. 4. Ovicell (ov) with avicularium (av).

PLATE 1

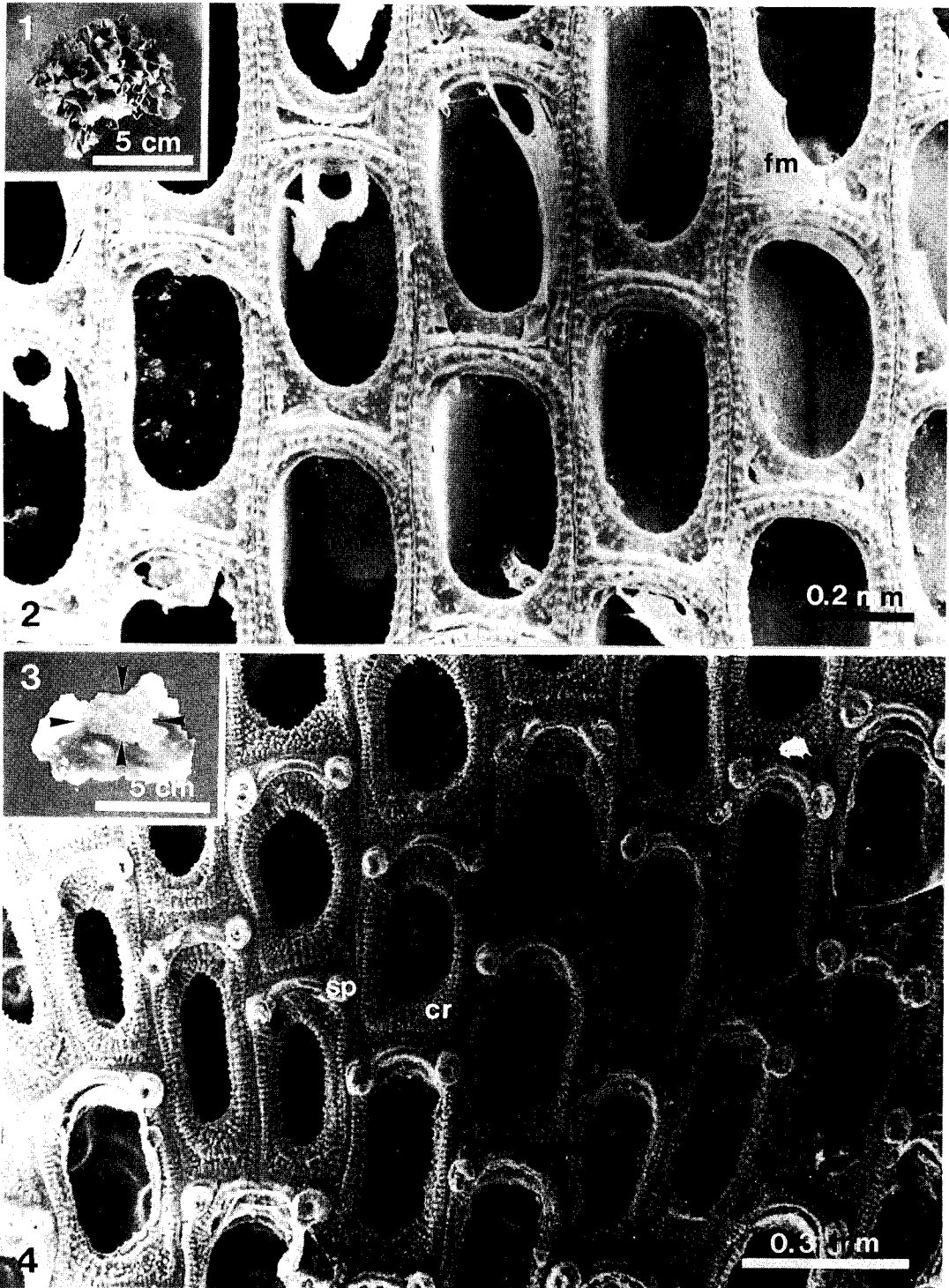


PLATE 2

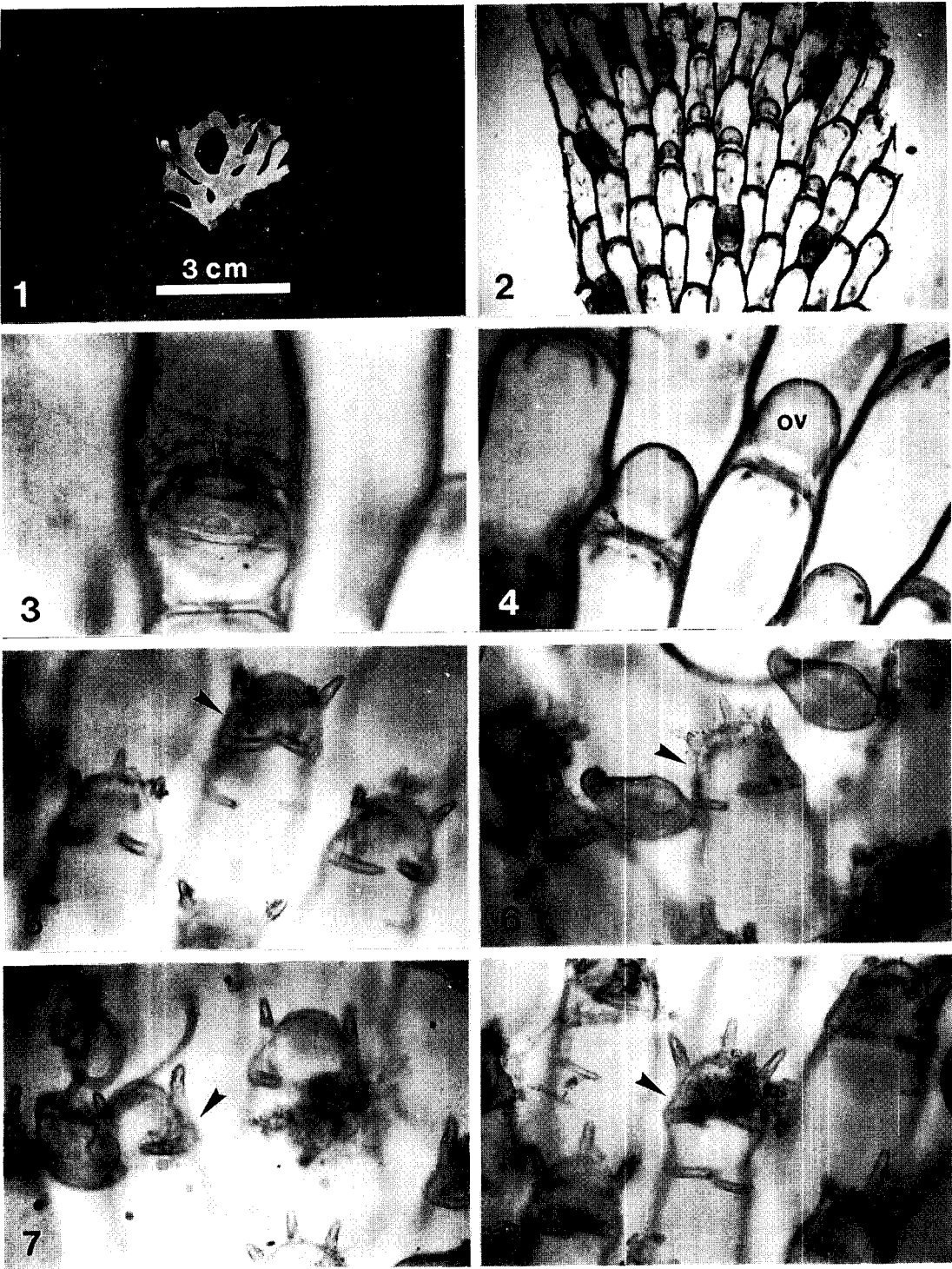


PLATE 3

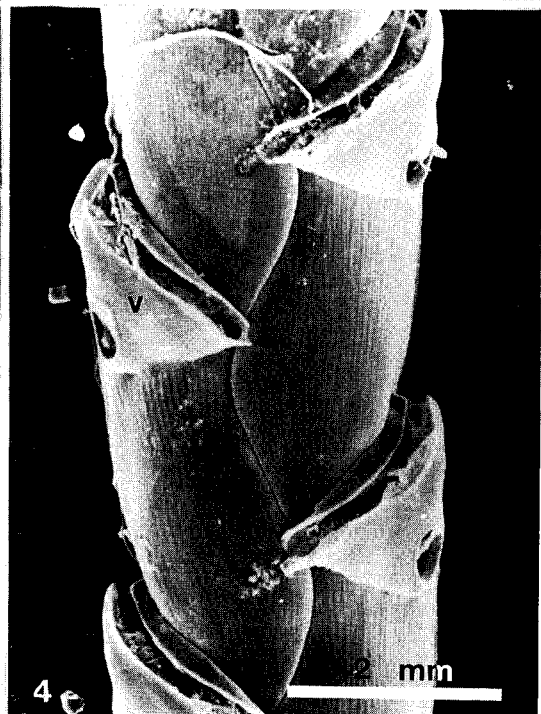
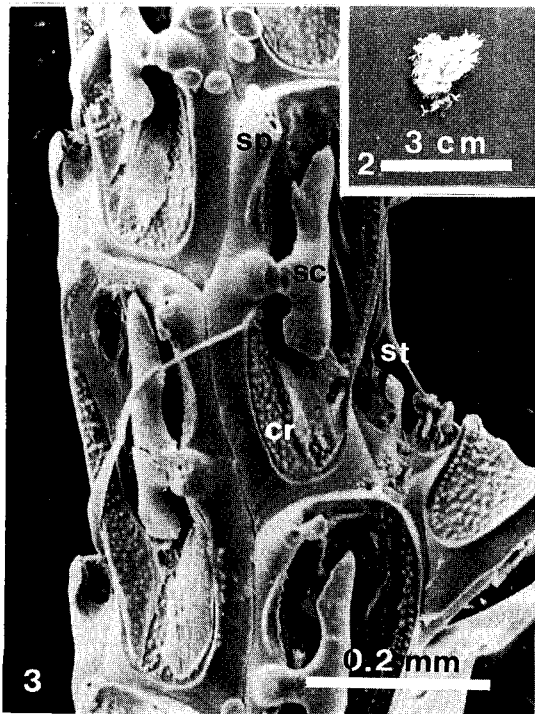
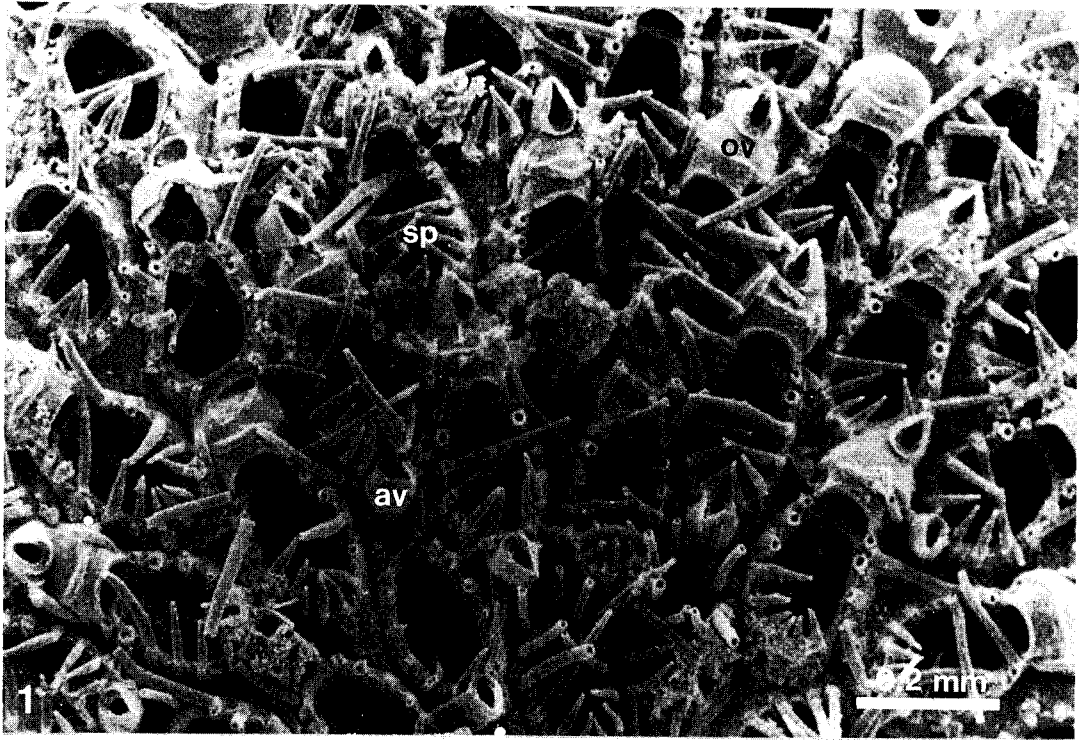


PLATE 4

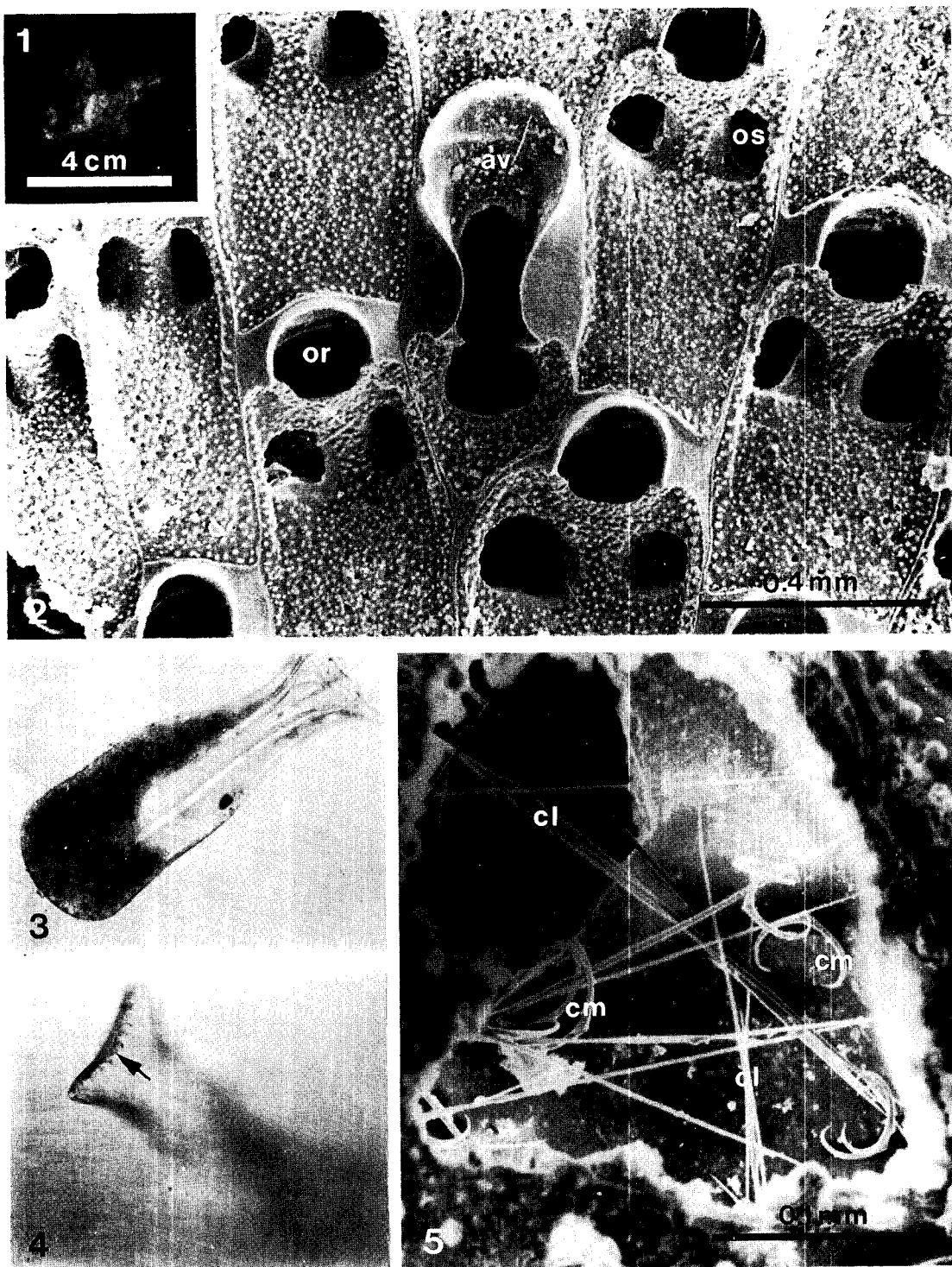


PLATE 5

